Specification Amendments

Amend paragraph [0002] at page 1 as follows:

[0002] The field of the present invention relates to data reading systems. In particular, an optical scanner ~~scanning~~ and method for optical scanning are described herein for creating a dense scan pattern. The field of the present invention is especially suitable for use as a fixed scanner such as that employed at a supermarket checkout counter reading bar codes such as those found on consumer products.

Amend paragraph [0008] at page 2 as follows:

[0008] The present invention is directed to a system for and a method of efficiently generating a dense pattern of scan lines. In a preferred configuration, a laser beam is dithered before being directed onto a scanning mechanism, such as a polygon mirror, which scans the beams across pattern mirrors to generate a higher density scan pattern out into the scan volume. Return light reflecting off an object being scanned is retrodirectionally collected and directed by a collection element such as a collection lens toward a detector. In a preferred construction, the system may optionally include a concentrating element disposed upstream of the detector if needed to compensate for the dithering action by redirecting the return light focused by the collection element back onto the detector.

Amend paragraph [0029] at page 4 as follows:

[0029] Fig. 21 is a schematic illustrating a processing method according to a first ~~third~~ embodiment.

Amend paragraph [0036] at page 5 as follows:

[0036] The beam generators 50, 60 are provided with an internal dithering mechanism whereby the reading beams 51, 61 exiting the beam generators are dithered or pivoted over an angle q in a plane generally parallel to the axis of rotation of the facet wheel 20 thus striking the facets of the polygon mirror 15. This dithering of the beams 51, 61 prior to being scanned by the facets of the facet wheel 20 creates a greater variation in scan line coverage. Fig. 1 illustrates a scan pattern 23 produced when the dithering mechanisms of the beam generators 50, 60 are inactive and Fig. 2 illustrates a scan pattern 25 produced when the beam generators 50, 60 are active. Figs. 5 and 6 illustrate the a portion of the scan pattern 25 generated only by the pattern mirrors 34, 36, 38 and 44.

Amend paragraph [0037] at page 5 as follows:

[0037] Return light from the beams which is reflected/refracted off an object is retro-directionally collected, reflecting off the scan facets 20a, 20b, 20c and focused by collection lenses 52, 62 onto respective detectors 72, 82. The beam generator 50 is assembled and positioned within collection lens 52 and beam generator 60 is assembled and positioned within collection lens 62. The beam generators 50, 60 may be concentrically positioned within the collection lenses

52, 62 as illustrated in Figs. 1-4 or may be eccentrically positioned as shown in the embodiment of Fig. 13 described below. Other types of collection systems other than lenses may be used such as collection ~~mirrors,~~ mirrors or holographic elements~~ or other systems may be employed~~.

Amend paragraph [0044] at page 7 as follows:

[0044] In the operation of the beam generator 110, a light beam 107 from light source 105 enters aperture 112 in the housing 113 and passes through an opening 132 in suspension 130 whereupon the beam is reflected by a first fixed mirror 114. After reflection by mirror 114, the beam travels along path 109 ~~202~~ and is again reflected by a second moveable mirror 116 and emerges along path 120 from the device passing through aperture 140. The input beam 107 is generally parallel to and moves in the same direction as the output beam path 120 ~~140~~ except that beam is scanning about that direction.

Amend paragraph [0047] at page 6 as follows:

[0047] Figs. 13-15 illustrate a preferred beam generator 150 suitable for use in the various embodiments described herein. The beam generator 150 is disposed eccentrically or offset from the center of the collection lens 152. The beam generator 150 includes a housing 156 into which the VLDM is mounted. The lens assembly 160 is also mounted within the housing 156 in front of the VLDM 158 for focusing the laser beam 161 ~~162~~ generated by the VLDM 158. The beam 161 ~~162~~ is directed along a first path 163, which is generally parallel to the axis of the collection lens 152, toward a routing mirror 164 which is disposed at a 45° angle thereby reflecting the beam 161 ~~162~~ by 90° along a second

path 165 and onto the dithering mirror 166. The dithering mirror 166 ~~which~~ then reflects the beam 161 ~~162~~ along an outgoing path 167.

Amend paragraph [0055] at page 9 as follows:

[0055] In addition, though the scanner 10 of Figs. 1-6 and the scanner 200 of Figs. 16-18 are shown with multiple laser sources or VLDMs, other types of beam generation systems may be employed such as disclosed in U.S. Patent No. 5,475,207 hereby incorporated by reference. Fig. 19 illustrates one example of a multibeam system 250 usable in these embodiments, the multiple beams being generated by a single laser source. The system 250 employs a light source such as a VLDM 254 generating a laser beam 255 directed toward a beam splitter 256. The beam splitter 256 splits the beam 255 into first reading beam 255a and second reading beam 255b. The reading beam 255a which passes through the beam splitter 256 passes into beam dithering mechanism 263 which dithers the beam 255a perpendicularly into the page as viewed in the figure and onto the facet wheel 252. The facet wheel 252 scans the dithered beam off of pattern mirrors in similar fashion as in previous embodiments. Return light is retrodirectively collected off the facet wheel and is focused by collection lens 264 onto detector 266a ~~263~~. Off-axis return light spot is redirected by redirecting element ~~264~~ 265a.

Amend paragraph [0056] at page 10 as follows:

[0056] In similar fashion, the reading beam 255b which is reflected by the beam splitter 256 is directed to a first routing mirror 258, which in turn reflects the beam toward second routing mirror 259, which then reflects the beam toward

third routing mirror 260. The beam 255b is thereby directed into beam dithering mechanism ~~262~~ 261 which dithers the beam 255b perpendicularly into the page as viewed in the figure and onto the facet wheel 252. The facet wheel 252 scans the dithered beam off of pattern mirrors in similar fashion as in previous embodiments. Return light is retrodirectively collected off the facet wheel 252 and is focused by collection lens ~~261~~ 262 onto detector 266b. Off-axis return light spot is redirected by redirecting element 265b.

Amend paragraph [0059] at page 11 as follows:

[0059] Fig. 21 illustrates a system 300 in which ~~is~~ a single laser diode 302 produces an optical beam 304 onto a beam splitter 306. The beam splitter 306 divides the beam reflecting a portion of the beam, first reading 304a, onto the facet wheel 310 and transmitting a portion of the beam, second reading 304b, which is folded by a fold mirror 308 and directed onto the facet wheel 310. A first beam dithering mechanism 312 is positioned in the path of the first reading beam 304a upstream of the facet wheel 310 and a second beam dithering mechanism 314 is positioned in the path of the second reading beam 304b upstream of the facet wheel 310. The dithered reading beams 304a and 304b are scanned across pattern mirrors 315. Return signal is retrodirectionally collected off the polygon mirror 310 with separate signals collected by collection optics 320/322 onto detectors 321, 323. The redirecting cones and band pass filters are not illustrated in this figure. In the first processing channel or circuit, the light collected at detector 321 from reading beam 304b is processed by an analog signal processor 325 and then sent to the digital signal processor 330. Similarly,

return signal collected by detector 323 from the reading beam 304a is processed by an analog signal processor 327 and then converted by digital processor 332.

Amend paragraph [0066] at page 14 as follows:

[0066] The above examples illustrate ~~two beam~~ two-beam systems, however the systems may accommodate more than two beams (for example ~~3~~ three or more) such that return signals from ~~2, 3~~ two, three or more detectors are each digitized and decoded in parallel channels and then the preprocessed data streams are ~~then~~ combined in a microprocessor. Additional microprocessor speed may be required if more data strings are added, but the optical system architecture ~~will~~ may remain basically the same.

Amend paragraph [0067] at page 14 as follows:

[0067] Fig. 23 also illustrates a controller 580 electrically connected to the dithering mechanisms 512, 514. By controlling the operation of the dithering mechanisms, the scan patterns generated by the system may be varied. In its simplest form, deactivating (i.e. turning on) the dithering mechanisms 512, 514 would generate one scan pattern, for example scan pattern 23 in Fig. 1 and activating (i.e. turning on) the dithering mechanisms 512, ~~513~~ 514 would generate a second scan pattern, for example scan pattern 25 of Fig. 2.